

Patent
42534-8300

IN THE CLAIMS:

1 1. (Original) A recoil starter comprising:
2 a casing having a reel shaft formed on an inside thereof;
3 a rope reel rotatably mounted to said reel shaft and having a recoil rope wound
4 therearound;
5 a spiral spring for rotationally urging said rope reel in a direction of winding said
6 recoil rope;
7 a cam rotatably mounted to said reel shaft in a manner to face said rope reel;
8 a rotational member attached to a crankshaft of an engine and provided with a
9 ratchet mechanism which disengageably engages with said cam; and
10 a damper spring in the form of a coil spring disposed around outer peripheries of
11 bosses which are formed on said rope reel and said cam, respectively, said damper spring having
12 opposite ends held respectively on said rope reel and said cam, wherein a rotational force of said
13 rope reel is transmitted to said cam via a resilience of said damper spring and a rotation of said
14 cam is then transmitted to said rotational member via said ratchet mechanism to thereby start the
15 engine, wherein
16 said opposite ends of said damper spring are provided with respective engaging
17 portions which are radially movably supported by holding portions on said rope reel and said
18 cam, respectively, so that when said damper spring is resiliently deformed by a startup resistance
19 of the engine, substantially the overall length of a coiled portion of said damper spring winds and
20 tightens uniformly around the outer peripheral surfaces of both of said bosses formed on said
21 rope reel and said cam, respectively.

Patent
42534-8300

1 2. (Original) The recoil starter according to claim 1, wherein said bosses are
2 extended from and integrally formed on said rope reel and said cam, respectively, and include
3 respective end faces which are butted against each other substantially at the middle of said coiled
4 portion of said damper spring.

1 3. (Original) The recoil starter according to claim 1, wherein said cam is rotatably
2 supported at two locations, one of the locations being a center support portion defined by an end
3 face of said reel shaft and the other being an outer peripheral support portion defined by an outer
4 peripheral surface of a flange portion which is radially outwardly protruded and integrally
5 formed on said cam so as to engage with the side surface of said rope reel.

1 4. (Original) The recoil starter according to claim 2, wherein said cam is rotatably
2 supported at two locations, one of the locations being a center support portion defined by an end
3 face of said reel shaft and the other being an outer peripheral support portion defined by an outer
4 peripheral surface of a flange portion which is radially outwardly protruded and integrally
5 formed on said cam so as to engage with the side surface of said rope reel.

1 5. (Original) The recoil starter according to claim 1, wherein said rope reel and said
2 cam are provided on joining surfaces thereof with respective annular recesses which are formed
3 to face each other so as to receive said damper spring therein, said rope reel and said cam being
4 coupled together via said damper spring; and

5 said cam includes an outer peripheral wall which forms said annular recess
6 thereof and on which a plurality of openings are formed circumferentially apart so that portions

Patent
42534-8300

7 of said outer peripheral wall between the adjacent openings each define a cam pawl which is
8 engageable with said ratchet mechanism.

1 6. (Original) The recoil starter according to claim 2, wherein said rope reel and said
2 cam are provided on joining surfaces thereof with respective annular recesses which are formed
3 to face each other so as to receive said damper spring therein, said rope reel and said cam being
4 coupled together via said damper spring; and

5 said cam includes an outer peripheral wall which forms said annular recess
6 thereof and on which a plurality of openings are formed circumferentially apart so that portions
7 of said outer peripheral wall between the adjacent openings each define a cam pawl which is
8 engageable with said ratchet mechanism.

1 7. (Original) The recoil starter according to claim 3, wherein said rope reel and said
2 cam are provided on joining surfaces thereof with respective annular recesses which are formed
3 to face each other so as to receive said damper spring therein, said rope reel and said cam being
4 coupled together via said damper spring; and

5 said cam includes an outer peripheral wall which forms said annular recess
6 thereof and on which a plurality of openings are formed circumferentially apart so that portions
7 of said outer peripheral wall between the adjacent openings each define a cam pawl which is
8 engageable with said ratchet mechanism.

1 8. (Original) The recoil starter according to claim 4, wherein said rope reel and said
2 cam are provided on joining surfaces thereof with respective annular recesses which are formed
3 to face each other so as to receive said damper spring therein, said rope reel and said cam being
4 coupled together via said damper spring; and

Patent
42534-8300

5 said cam includes an outer peripheral wall which forms said annular recess
6 thereof and on which a plurality of openings are formed circumferentially apart so that portions
7 of said outer peripheral wall between the adjacent openings each define a cam pawl which is
8 engageable with said ratchet mechanism.

1 9. (Original) The recoil starter according to claim 5, wherein said outer peripheral
2 wall of said cam forming said annular recess thereof is provided on one side thereof with a
3 flange portion which is radially outwardly extended and integrally formed on said outer
4 peripheral wall, and wherein each of said cam pawls has opposite ends thereof connected to and
5 supported by an inner peripheral rim of said flange portion and a bottom of said annular recess of
6 said cam, respectively.

1 10. (Original) The recoil starter according to claim 6, wherein said outer peripheral
2 wall of said cam forming said annular recess thereof is provided on one side thereof with a
3 flange portion which is radially outwardly extended and integrally formed on said outer
4 peripheral wall, and wherein each of said cam pawls has opposite ends thereof connected to and
5 supported by an inner peripheral rim of said flange portion and a bottom of said annular recess of
6 said cam, respectively.

1 11. (Original) The recoil starter according to claim 7, wherein said outer peripheral
2 wall of said cam forming said annular recess thereof is provided on one side thereof with a
3 flange portion which is radially outwardly extended and integrally formed on said outer
4 peripheral wall, and wherein each of said cam pawls has opposite ends thereof connected to and
5 supported by an inner peripheral rim of said flange portion and a bottom of said annular recess of
6 said cam, respectively.

Patent
42534-8300

1 12. (Original) The recoil starter according to claim 8, wherein said outer peripheral
2 wall of said cam forming said annular recess thereof is provided on one side thereof with a
3 flange portion which is radially outwardly extended and integrally formed on said outer
4 peripheral wall, and wherein each of said cam pawls has opposite ends thereof connected to and
5 supported by an inner peripheral rim of said flange portion and a bottom of said annular recess of
6 said cam, respectively.

1 13. (Previously Presented) A recoil starter comprising:
2 a casing having a reel shaft formed on an inside thereof;
3 a rope reel rotatably mounted to said reel shaft and having a recoil rope wound
4 therearound;
5 a spiral spring for rotationally urging said rope reel in a direction of winding said
6 recoil rope;
7 a cam rotatably mounted to said reel shaft in a manner to face said rope reel;
8 a rotational member attached to a crankshaft of an engine and provided with a
9 ratchet mechanism which disengageably engages with said cam; and
10 a damper spring interposed between said rope reel and said cam, wherein a
11 rotational force of said rope reel is transmitted to said cam via a resilience of said damper spring
12 and a rotation of said cam is then transmitted to said rotational member via said ratchet
13 mechanism to thereby start the engine, wherein
14 said rope reel and said cam are provided on joining surfaces thereof with
15 respective annular recesses which are formed to face each other so as to receive said damper
16 spring therein, said damper spring having opposite ends thereof held respectively onto said rope

Patent
42534-8300

17 reel and said cam so that said rope reel and said cam are coupled together via said damper spring;
18 and

19 said cam includes an outer peripheral wall which forms said annular recess
20 thereof and on which a plurality of openings are formed circumferentially apart so that portions
21 of said outer peripheral wall between the adjacent openings each define a cam pawl which is
22 engageable with said ratchet mechanism, the outer peripheral wall of the cam surrounds the
23 damper spring and each of the plurality of openings formed in the outer peripheral wall of the
24 cam penetrates radially the outer peripheral wall of the cam.

1 14. (Original) The recoil starter according to claim 13, wherein said outer peripheral
2 wall of said cam forming said annular recess thereof is provided on one side thereof with a
3 flange portion which is radially outwardly extended and integrally formed on said outer
4 peripheral wall, and wherein each of said cam pawls has opposite ends thereof connected to and
5 supported by an inner peripheral rim of said flange portion and a bottom of said annular recess of
6 said cam, respectively.

1 15. (Original) The recoil starter according to claim 13, wherein said cam is rotatably
2 supported at two locations, one of the locations being a center support portion defined by an end
3 face of said reel shaft and the other being an outer peripheral support portion defined by an outer
4 peripheral surface of a flange portion which is radially outwardly protruded and integrally
5 formed on said cam so as to engage with the side surface of said rope reel.

1 16. (Original) The recoil starter according to claim 14, wherein said cam is rotatably
2 supported at two locations, one of the locations being a center support portion defined by an end

Patent
42534-8300

- 3 face of said reel shaft and the other being an outer peripheral support portion defined by an outer
- 4 peripheral surface of said flange portion which engages with the side surface of said rope reel.